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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,105	04/13/2004	Shunsuke Kobayashi	CU-3682 RJS	4514

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EXAMINER	
HON, SOW FUN	

ART UNIT	PAPER NUMBER
1772	

MAIL DATE	DELIVERY MODE
07/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/823,105	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	Sow-Fun Hon	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/07,3/07,02/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/04/07 has been entered.

Response to Amendment

Withdrawn Rejections

2. The 35 U.S.C. 103(a) rejections of claims 1, 3-12 over Suzuki in view of Smith, as the primary prior art combination, are withdrawn due to Applicant's amendment dated 05/04/07.

New Rejections

Claim Objections

3. Claim 7 is objected to because of the following informalities: the plurality of "conductive layers" should not be qualified with "a" which designates a singular object. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear whether the "it" refers to the core or the particle. For the purposes of examination, it is assumed that the "it" refers to the core.

Claim Rejections - 35 USC § 102

5. Claims 1, 3-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshikawa (Frequency Modulation Response of a Tunable Birefringent Mode Nematic Liquid Crystal Electrooptic Device Fabricated by Doping Nanoparticles of Pd Covered with Liquid-Crystal Molecules, Japan Journal of Applied Physics, vol. 41).

Regarding claim 1, Yoshikawa teaches in Fig. 1(c), shown on the next page, a particle comprising: a core having a diameter of 2.5 nm (page L1315a, 3rd paragraph), which is within the range of smaller than 100 nm, and comprising a plurality of nanoparticles; and a protective layer comprising liquid crystal molecules provided on the periphery of the core (core metal nanoparticles, page L1315a, 3rd paragraph), which renders the particle liquid-crystal soluble. Yoshikawa teaches that the liquid crystal molecules can be at least one kind selected from 4-cyano-4'-n-pentylbiphenyl, also

known as 5CB (page L1315a, 2nd paragraph) as defined in Applicant's specification (pentylcyanobiphenyl, page 20, EXAMPLES).

Regarding claim 3, Yoshikawa discloses in Fig. 1(c), shown below, that the short axis width of the liquid crystal molecule is equal to or less than the diameter of the core.

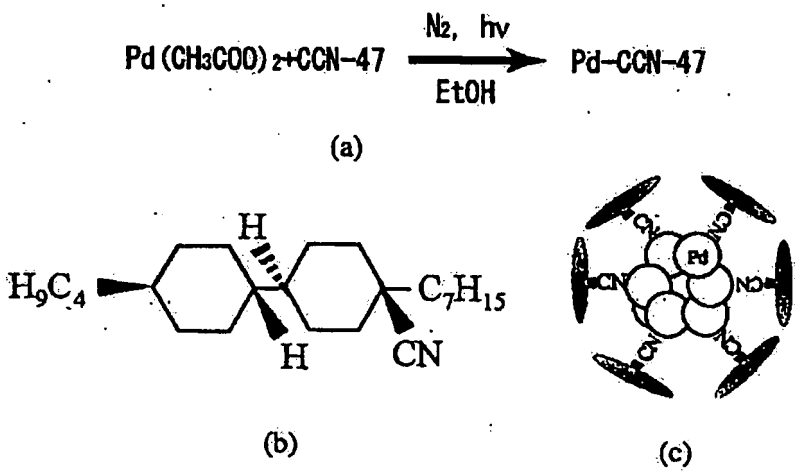

Fig. 1. Synthesising process of Pd-CCN-47 using an alcohol reduction method, where (a) is a chemical equation showing the synthesising process of Pd-CCN-47, (b) shows the CCN-47 chemical structure, and (c) illustrates the Pd-CCN-47 nanoparticles.

Regarding claims 4-6, Yoshikawa teaches a method for manufacturing the liquid crystal-soluble particle, wherein the nanoparticle is a metal nanoparticle made of metal Pd atoms (Pd, page L1315, 2nd paragraph), and a plurality of the Pd metal ions are reduced in a solution containing the liquid crystal molecules to allow the liquid crystal molecules to bond to the periphery of the metal Pd nanoparticle to form a particle with a metal core (alcohol reduction method, shown in Figs. 1 (a) – 1(c), wherein Pd is in the

ion form in the metal acetate complex $Pd(CH_3COO)_2$). The metal ion is a metal acetate salt ($Pd(CH_3COO)_2$, fig. 1(a)).

Claim Rejections - 35 USC § 103

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa as applied to claims 1, 3-6 above, and further in view of Kobayashi (US 4,701,024) and Asano (US 909,605).

Yoshikawa teaches a liquid crystal-soluble particle comprising: a core having a diameter smaller than 100 nm and comprising a plurality of nanoparticles; and a protective layer comprising liquid crystal molecules provided on the periphery of the core, wherein the liquid crystal molecules are at least one kind selected from 4-cyano-4'-n-pentylbiphenyl, as described above. In addition, Yoshikawa teaches that the liquid crystal-soluble particle is dissolved or dispersed in the liquid crystal layer of a liquid crystal device element (L1315a, 2nd paragraph). Yoshikawa fails to disclose that the liquid crystal device element comprises: a pair of parallel substrates; conductive layers provided respectively on facing inner surfaces of these substrates; a pair of liquid crystal alignment layers provided respectively with pre-tilt angle on facing inner surfaces of the conductive layers; wherein the liquid crystal layer is formed between the pair of liquid crystal alignment layers.

However, Kobayashi teaches that a liquid crystal device element shown in Fig. 2A (cell, column 4, lines 30-34) comprises the basic elements of: a pair of parallel substrates (transparent plates 5, 6, column 4, lines 34-35); conductive layers provided

respectively on facing inner surfaces of these substrates (electrodes 7 and 8 on the inner surfaces, column 4, lines 34-37); and a liquid crystal layer formed in between (liquid crystal molecules 3, column 4, lines 36-38), wherein metal particles (column 4, lines 66-68) are dispersed in the liquid crystal (column 6, lines 37-40), for the purpose of providing the liquid crystal with an effective switching function (column 5, lines 35-42). Kobayashi fails to teach that the liquid crystal layer is formed in between a pair of liquid crystal alignment layers formed on the facing inner surfaces of the pair of conductive layers, wherein the alignment layers are provided respectively with a pre-tilt angle.

However, Asano teaches a liquid crystal display device element wherein the liquid crystal layer is aligned between a pair of liquid crystal alignment layers (pair of substrates each having an alignment layer, column 2, lines 43-47), and wherein the liquid crystal alignment layers are provided respectively with a pre-tilt angle (column 3, lines 1-2), for the purpose of providing a pre-tilt angle to the liquid crystal (column 5, lines 43-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the liquid crystal device element of Yoshikawa, by forming the liquid crystal layer containing the liquid crystal-soluble metal core particles, in between a pair of liquid crystal alignment layers formed on the facing inner surfaces of a pair of conductive layers which are provided on the inner surfaces of a pair of parallel substrates, as taught by Kobayashi in view of Asano, wherein the liquid crystal alignment layers are provided respectively with a pre-tilt angle, in order to align the liquid crystal layer with the desired pre-tilt angle, as taught by Asano.

7. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa in view of Kobayashi and Asano, as applied to claim 7 above, and further in view of McKnight (US 6,304,239).

Regarding claims 8-10, Yoshikawa in view of Kobayashi and Asano, teaches the structure of the liquid crystal device element as discussed above. In addition, Kobayashi teaches that the liquid crystal device element has a control circuit for applying voltage (Fig. 2A, circuit 27, column 7, lines 25-30, Fig. 12). Yoshikawa in view of Kobayashi and Asano, fails to teach that the control circuit for applying voltage, modulates at least the frequency from among the parameters of frequency and voltage, and is provided on the conductive layer, for varying light transmittance of the liquid crystal layer, wherein under a constant applied voltage, an electro-optical response is turned on by switching the frequency of the applied electric field from low frequency to high frequency, and the electro-optical response is turned off by switching the frequency from high frequency to low frequency, let alone that the frequency modulation range is in a range of 20 Hz to 100 kHz.

However, McKnight teaches a liquid crystal device element (column 1, lines 18-24), wherein a control circuit for applying voltage, while modulating frequency (control voltage is modulated with a high frequency oscillation, column 15, lines 6-10), is provided on the conductive layer (electrode, column 15, lines 6-8) for the purpose of varying light transmittance of the liquid crystal layer (crossover frequency from positive dielectric anisotropy to negative dielectric anisotropy, column 15, lines 10-14), and under a constant applied voltage, an electro-optical response is turned on by switching

the frequency of the applied electric field from low frequency to high frequency (crossover frequency from positive dielectric anisotropy to negative dielectric anisotropy, column 15, lines 10-14), and the electro-optical response is turned off by switching the frequency from high frequency to low frequency (dual frequency electro-optical liquid crystal, column 15, lines 29-33). McKnight teaches that the frequency modulation range of the electro-optical response is for example, in a range of 5 kHz to 100 kHz (column 15, lines 9-10), which is within the claimed range of 20 Hz to 100 kHz. McKnight teaches that the duration of frequency modulation can be from a fraction of a ms to over 1.0 ms (column 14, lines 1-7), which means that a time constant of response concerning turning the electro-optical response on and off is in a range of a fraction of a ms to over 1.0 ms, which overlaps the claimed range of 0.1 ms to 10 ms. McKnight teaches that these voltage control parameters provide good display characteristics, which include color purity, high contrast, high brightness, and a fast response (column 1, lines 26-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used the voltage control parameters of McKnight, as the voltage control parameters for the control circuit in the liquid crystal device element of Yoshikawa in view of Kobayashi and Asano, in order to provide the desired liquid crystal display characteristics of color purity, high contrast, high brightness, and a fast response, as taught by McKnight.

Regarding claim 11, Yoshikawa teaches that the nanoparticle constituting the liquid crystal-soluble particle is at least one kind of metal atom selected from Pd (page L1315, 2nd paragraph)

Regarding claim 12, Yoshikawa in view of Kobayashi and Asano, fails to teach a method of driving the liquid crystal device element by using an active matrix mode.

However, McKnight teaches that one method of driving the liquid crystal device element is by using an active matrix mode (column 26, lines 6-13), for the purpose of utilizing the driving characteristics of that specific mode.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used an active matrix mode as a method of driving the liquid crystal device element of Yoshikawa in view of Kobayashi and Asano, in order to utilize the driving characteristics of the active matrix, as taught by McKnight.

Response to Arguments

8. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on (571)272-3186. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAiR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Hon.
Sow-Fun Hon
06/11/07

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SUPERVISORY PATENT EXAMINER
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